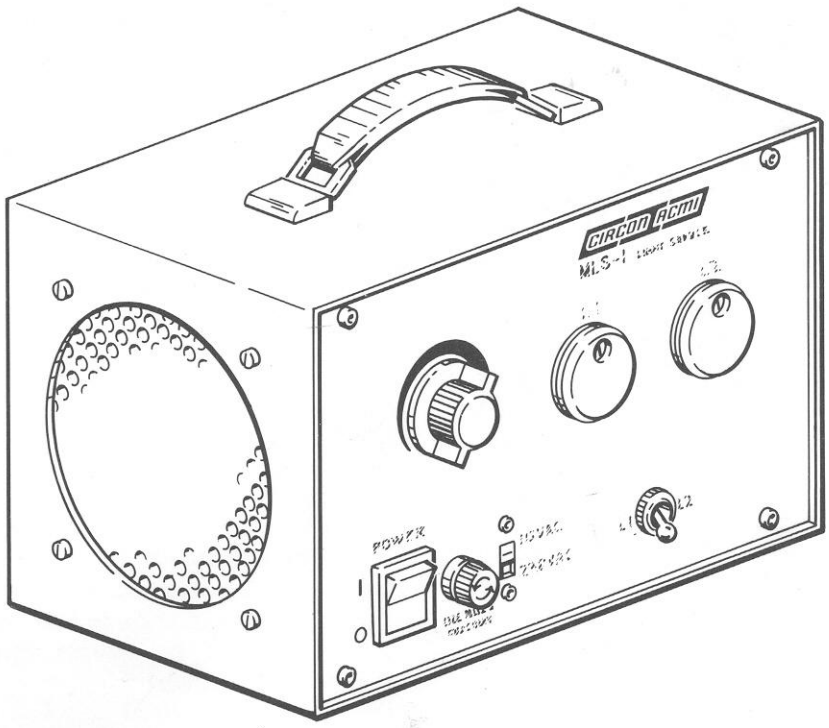
PUBLICATION NO. 99-0216

LIGHT SOURCE

PART NUMBER MLS-1

OPERATION AND MAINTENANCE MANUAL



CIRCON ACMI

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TABLE OF CONTENTS

Paragraph		Page
	List of Illustrations	ii
	List of Tables	ii
	Safety Summary	iii
	Introduction	iv
	SECTION 1. GENERAL INFORMATION	
1.0	Introduction	1-1
1.1	Functional Description	1-1
1.2	Technical Specifications	1-1
1.3	Related Technical Manuals	1-1
	SECTION 2. PREPARATION FOR USE AND RESHIPMENT	
2.0	Introduction	2-1
2.1	Unpacking and Initial Inspection	2-1
2.2	Reshipment	2-1
	SECTION 3. OPERATION	
3.0	Introduction	3-1
3.1	Turn-On Procedure	3-1
3.2	Turn-Off Procedure	3-1
3.3	Controls and Indicators	3-1
	SECTION 4. THEORY OF OPERATION	
4.0	Introduction	4-1
4.1	Functional Block Diagram Theory	4-1
4.2	Schematic Diagram Theory	4-1
	SECTION 5. MAINTENANCE	
5.0	Introduction	5-1
5.1	Preventive Maintenance	5-1
5.2	Test Equipment	5-1
5.3	Operational Test	5-1
5.4	Troubleshooting	5-2
5.5	Cleaning	5-2
5.6	Lamp Replacement	5-2
	SECTION 6. STORAGE	
6.0	Introduction	6-1
6.1	Storage Instructions	6-1
	SECTION 7. MAINTENANCE PARTS LIST	
7.0	Introduction	7-1
7.1	Maintenance Parts List	7-1

LIST OF ILLUSTRATIONS

Figure No.	Title	Page
1-1	MLS-1 Light Source	1-1
3-1	MLS-1 Light Source Controls and Indicators	3-2
4-1	MLS-1 Light Source Functional Block Diagram	4-1
4-2	MLS-1 Light Source Schematic Diagram	4-2
5-1	Troubleshooting Flowcharts	5-3
7-1	MLS-1 Light Source Parts Location Diagram	7-4

LIST OF TABLES

Table No.	Title	Page
1-1	Technical Specifications	1-2
1-2	Related Technical Manuals	1-2
3-1	MLS-1 Light Source Controls and Indicators	3-2
5-1	Test Equipment List	5-1
7-1	MLS-1 Light Source Maintenance Parts List	7-1

SAFETY SUMMARY

The following are general safety precautions that personnel must understand and apply during many phases of operation and maintenance of the MLS-1 Light Source and accessories.

WARNING

This equipment uses alternating current voltages of 120 volts, ac, or more. In order for you to properly use this equipment and avoid injury to yourself due to improper use, the following safety procedures should be be followed:

- Disconnect the unit from the power source when servicing the unit.
- Discharge all terminals prior to servicing unit.
- When in use, avoid all energized components and do not contact any electrical terminals.
- Use the equipment only in its intended manner of use.

Turn Light Source off and disconnect from power source prior to replacing components or cleaning unit.

Keep fiber bundle away from flammable materials, particularly dark colored materials, as the high intensity light may ignite such materials.

If procedure has just been performed, lamp will be hot. Use hand protection when replacing bulb or allow to cool for a minimum of 30 minutes.

To avoid glare, never look directly into the light emitted from the MLS-1 Light Source or fiberscope light carrier.

Endoscopy should be performed only by persons with adequate training and preparation.

Consult the general medical literature regarding techniques, complications, and hazards prior to any endoscopic procedure.

Connect the MLS-1 Light Source only to a properly wired grounding receptacle.

Do not use the MLS-1 Light Source in the presence of flammable anesthetics or other hazardous areas.

To avoid electrical shock and burn hazards, follow instructions explicitly when removing or replacing lamp.

CAUTION

Set light intensity control to low setting prior to turning unit on, otherwise lamp life can become significantly reduced.

Never remove endoscope light carrier by pulling on the flexible part of the bundle. The bundle is composed of glass fibers which will break if subjected to abuse. Always remove light carrier by grasping the connector housing.

Use only non-conductive *CIRCON ACMI* or equivalent light carriers with *CIRCON ACMI* instruments. Some light carriers use a conductive wire or metal sheath between the distal and proximal ends. When using the MLS-1 Light Source with instruments of other manufacturers, use the appropriate light carrier.

The MLS-1 Light Source should be handled only by informed personnel. It is a precision device and can be inadvertently damaged.

Thoroughly study the Operation and Maintenance Manual before operating the MLS-1 Light Source.

Perform operational tests regularly to assure continued satisfactory operation.

Do not drape the side panels or block the ventilation system during operation of unit. Overheating can significantly reduce operating life.

INTRODUCTION

This manual contains operating and maintenance information applicable to the MLS-1 Light Source, commonly referred to as the light source, manufactured for *CIRCON ACMI*, Stamford, Connecticut.

This manual is divided into seven (7) sections as follows:

Section 1 – General Information

Section 2 – Preparation for Use and Reshipment

Section 3 – Operation

Section 4 – Theory of Operation

Section 5 – Maintenance

Section 6 – Storage

Section 7 – Maintenance Parts List

SECTION 1
GENERAL INFORMATION

1.0 INTRODUCTION. This section contains a functional description, list of technical specifications, and a list of related technical manuals.

1.1 FUNCTIONAL DESCRIPTION. The MLS-1 Light Source (see figure 1-1) is a portable endoscopic dual illumination light source. All controls are located on the front panel. The light source utilizes 115VAC or 230VAC, 50-400Hz power. Selection of either 115VAC or 230VAC operation is controlled by the front panel 115VAC/230VAC switch. Light is supplied to either of two light receptacles (L1 or L2), as controlled by the front panel L1/L2 switch. The L1 and L2 light receptacles (L1 or L2), as controlled by the front panel L1/L2 switch. The L1 and L2 light receptacles have covers to prevent the escape of light when not in use. The intensity of illumination is varied by a front panel intensity control.

1.2 TECHNICAL SPECIFICATIONS. Table 1-1 lists the technical specifications for the light source.

1.3 RELATED TECHNICAL MANUALS. Table 1-2 lists the technical manuals required to support the light source.

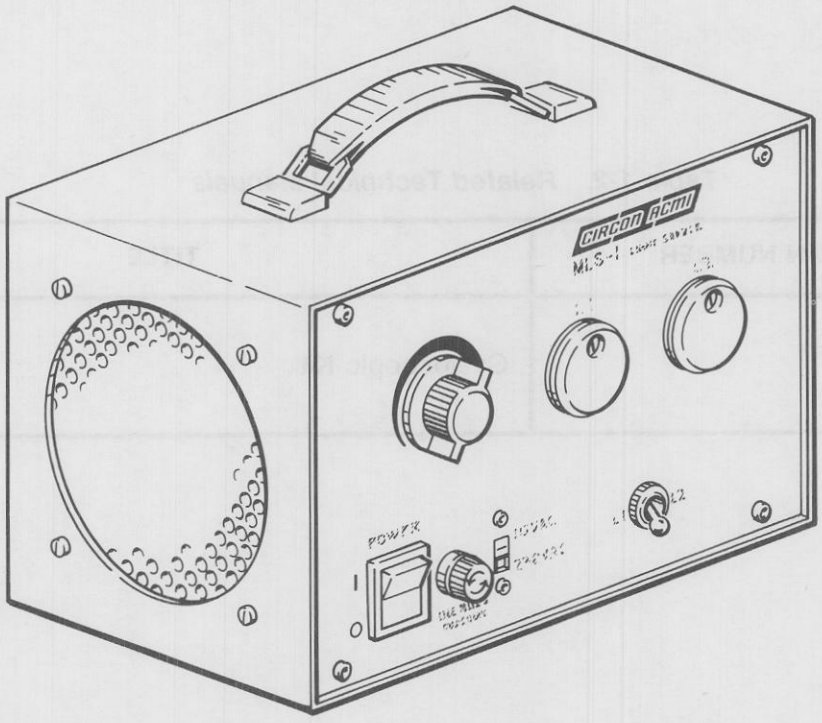


Figure 1-1. MLS-1 Light Source

Table 1-1. Technical Specifications

FUNCTION	CHARACTERISTIC
Input Power	115VAC or 230VAC, 50-400Hz
Current	1.85 Amperes (maximum)
Power Dissipation	230 Watts (nominal)
Lamps Type Life	 EJA, 150 Watt Halogen 40 hours at 150 Watts
Weight	15 Pounds (approximate)
Length	6.5 Inches
Height	7 Inches
Width	10.75 Inches

Table 1-2. Related Technical Manuals

PUBLICATION NUMBER	TITLE
99-0219	Cystoscopic Kit

SECTION 2
PREPARATION FOR USE AND RESHIPMENT

2.0 INTRODUCTION. This section contains general procedures for unpacking and initial inspection, and reshipment for the MLS-1 Light Source.

2.1 UNPACKING AND INITIAL INSPECTION. Visually examine the shipping carton and light source for any damage. Any breakage or other apparent damage should be noted, the evidence retained, and the carrier or shipping agency contacted. Immediately notify the *CIRCON ACMI* sales representative or Customer Service of any shipping damage or discrepancies.

a. Verify the shipping carton contains the components listed on the packing list.

b. Perform the operational test in accordance with Section 5 of this manual.

CAUTION

To avoid inadvertent damage, study this Operation and Maintenance Manual thoroughly before proceeding to Section 5 of this manual.

2.2 RESHIPMENT. Packaging is required when sending equipment or components to *CIRCON ACMI* for repair. Items to be packaged should first be placed in a moisture-proof bag and sealed. This item should be cushioned with a shock-absorbent material (such as styrofoam or foam rubber) and enclosed in a snug fitting carton or box. A description of the damage or discrepancies should be included.

SECTION 3
OPERATION

3.0 INTRODUCTION. This section provides turn-on and turn-off procedures, along with controls and indicators information for the MLS-1 Light Source.

3.1 TURN-ON PROCEDURE. The following steps provide the turn-on procedure for the MLS-1 light source.

a. Ensure front panel POWER switch is in the off position (switch not illuminated).

b. Connect power cord to a properly wired grounded receptacle.

c. Set front panel 115VAC/230VAC switch for proper input power.

d. Set front panel intensity control to fully counter-clockwise position (minimum intensity).

e. Insert light bundle into front panel receptacle (push cover aside).

f. Repeat step (e) for other receptacle.

CAUTION

Do not remove light bundle from receptacle by pulling on flexible part of the bundle. The bundle is composed of glass fibers which will break if subjected to abuse. Always remove bundle by grasping the connector housing.

g. Place front panel POWER switch to on position (switch will illuminate and fan will operate).

h. To illuminate lamp 1 place front panel L1/L2 switch to L1 position and adjust front panel intensity control.

WARNING

To avoid glare, do not look directly at light output from bundle.

i. To illuminate lamp 2 place front panel L1/L2 switch to L2 position and adjust front panel intensity control.

3.2 TURN-OFF PROCEDURE. The following steps provide the turn-off procedure for the light source.

a. Place the front panel POWER switch to off position (switch will not be illuminated and fan will stop).

b. Set front panel intensity control to fully counter-clockwise position (minimum intensity).

3.3 CONTROLS AND INDICATORS. Controls and indicators for the light source are illustrated on figure 3-1 and described in table 3-1.

Table 3-1. MLS-1 Light Source Controls and Indicators

FIGURE 3-1 INDEX NO.	CONTROL/INDICATOR	FUNCTION
1	Intensity control	Varies the intensity of light to lamp 1 or 2, as determined by the L1/L2 switch.
2	L1 light fitting	Provides fitting for light bundle.
3	L2 light fitting	Provides fitting for light bundle.
4	L1/L2 switch	Controls the selection of light from lamp 1 or 2.
5	115VAC/230VAC switch	Input power selection switch, set for voltage level of input power.
6	POWER switch	Applies input power to light source.

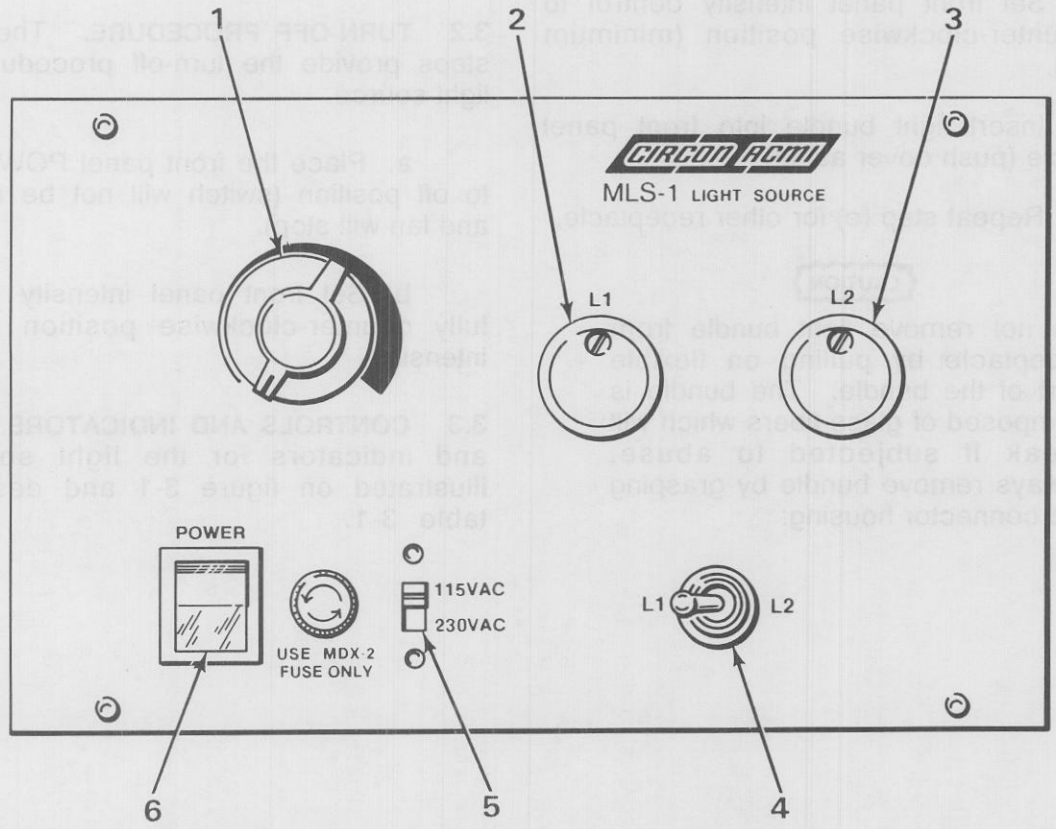


Figure 3-1. MLS-1 Light Source Controls and Indicators

SECTION 4
THEORY OF OPERATION

4.0 INTRODUCTION. This section provides theory of operation for the MLS-1 light source.

4.1 FUNCTIONAL BLOCK DIAGRAM THEORY. The light source consists of a power supply, fan, lamp drivers, and lamp functions (see figure 4-1). The power supply function provides power for the fan and converts the 115VAC or 230VAC input power to an AC DRIVE VOLTAGE which is applied to the lamp drivers function. The lamp drivers provide the LAMP 1 DRIVE signal to Lamp 1 or the LAMP 2 DRIVE signal to lamp 2, as controlled by the L1/L2 switch on the front panel. The level of lamp drive is controlled by the front panel intensity control to vary the amount of illumination to lamp 1 or lamp 2.

4.2 SCHEMATIC DIAGRAM THEORY. The light source (see figure 4-2) receives 115VAC or 230VAC power, and routes this power through interlock switch S4. The interlock switch disconnects power from the unit when the rear door is opened. When the interlock switch is closed, power is applied to front panel POWER switch S1, through front panel fuse F1. When switch S1 is closed, power is applied to transformer T1, through front panel 115VAC/230VAC switch S2. The 115VAC/230VAC switch connects either one of two input taps to T1, depending on the input voltage selected. The output of transformer T1 is applied to front panel intensity control R1 and the rectifier board. Intensity control R1 varies the amount of voltage that is applied to lamps L1 and L2, through L1/L2 switch S3. The front panel L1/L2 switch selects the lamp to be illuminated. The output of transformer T1 is also applied to the rectifier board through fuse F2. The ac power is rectified, regulated, and filtered prior to being applied to the fan.

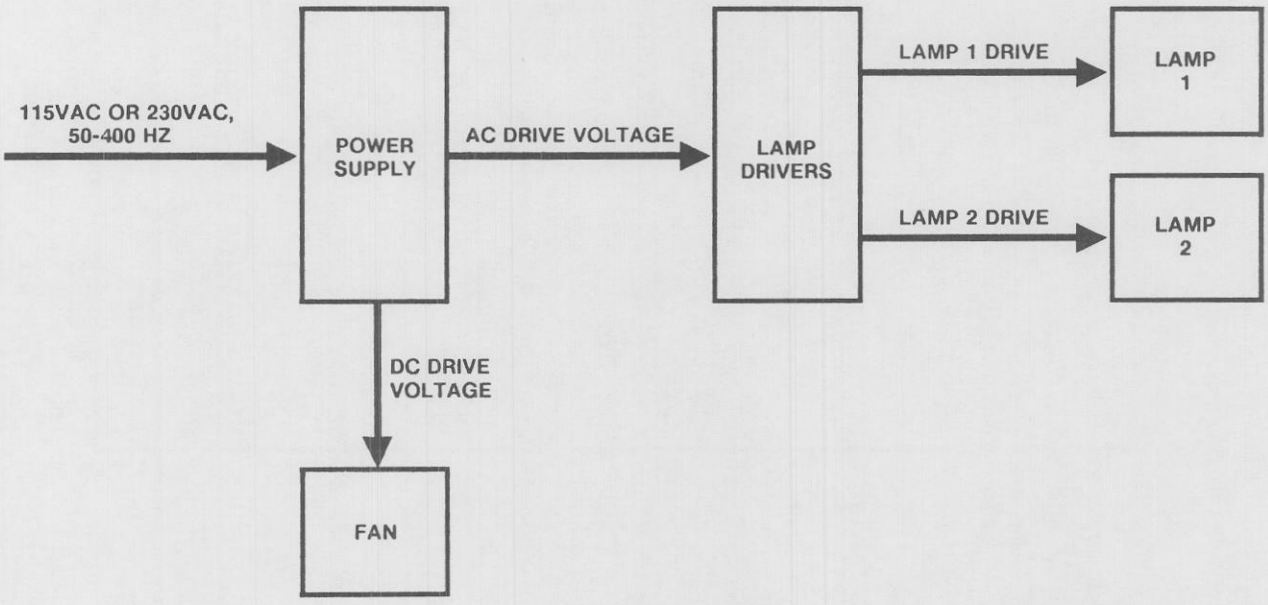
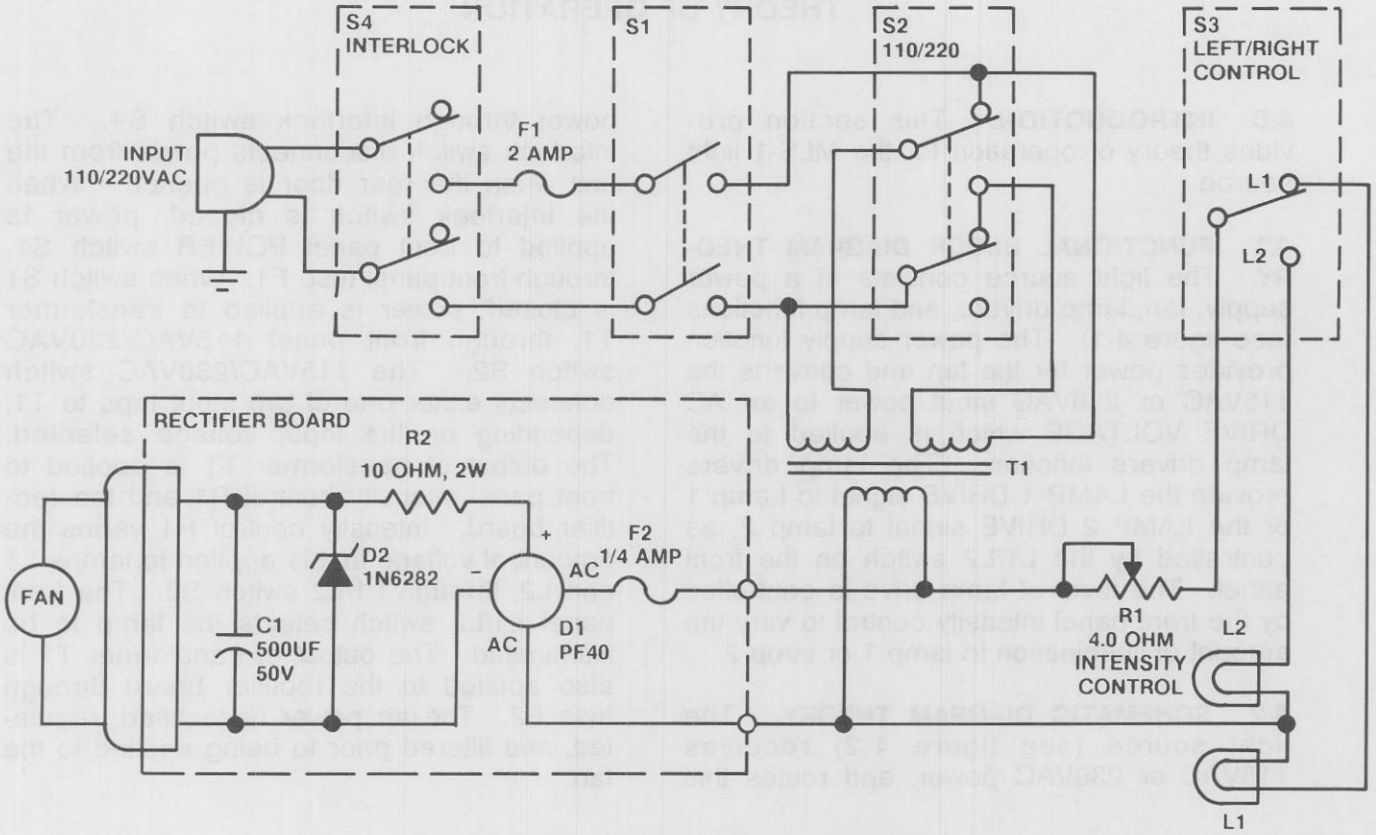


Figure 4-1. MLS-1 Light Source Functional Block Diagram



4-2. MLS-1 Light Source Schematic Diagram

SECTION 5
MAINTENANCE

5.0 INTRODUCTION. This section contains the information required for maintenance of the MLS-1 Light Source.

5.1 PREVENTIVE MAINTENANCE. There is no preventive maintenance required for the light source.

5.2 TEST EQUIPMENT. Table 5-1 lists the test equipment required for operation and maintenance of the light source.

5.3 OPERATIONAL TEST. The following steps provide the operational test for the light source. Refer to Table 5-1 for the test equipment required to perform this test.

a. ***Visual/Mechanical Test.***

1. Visually inspect unit for scratches and dents. Ensure handle, line cord, intensity control, light shield, lamp selector switch and fuse holder are secure.

2. Rotate each light shield 360 degrees in both directions. Light shields should be secured to front panel, but move freely.

3. Insert T-18855 test gauge into L1 light bundle fitting. Using the DPP-30 Chatillion gauge, record the amount of force required to remove the T-18855 gauge from fitting. Value should not be more than 6 pounds or less than 4 pounds.

4. Repeat step 3 for L2 light bundle fitting.

b. ***Functional Test.***

1. Plug unit into 115VAC source. Set 115VAC/230VAC voltage selector switch to 115VAC position. Rotate intensity control fully counter-clockwise (minimum intensity). Place L1/L2 lamp selector switch to the L1 position.

2. Set POWER switch to on position, and ensure POWER switch illuminates and fan operates.

3. Place a G92 light bundle into the L1 bundle fitting. Aim bundle at a nearby object (bench, wall).

4. Rotate intensity control fully clockwise (maximum intensity). Light intensity should increase while rotating control from minimum to maximum setting.

WARNING

To avoid glare, do not look directly at light output of the bundle.

5. Leave unit set at maximum light intensity (fully clockwise) and run for 15 minutes.

6. With unit on, open rear door. Power will turn off.

7. Close rear door. Power will turn back on.

8. Repeat Steps 4 and 5 for L2 light bundle fitting, placing the lamp selector switch to the L2 position.

Table 5-1. Test Equipment List

EQUIPMENT	PURPOSE
T-18855 Test Gauge	Test gauge to simulate a light bundle.
DPP-30 Chatillion Gauge	Measures force required to pull light bundle from fitting.

9. Set POWER switch to off and disconnect unit from the 115VAC outlet.

10. Set the 115VAC/230VAC voltage selector switch to the 230VAC position and connect unit to the 230VAC source.

11. Rotate intensity control fully counter-clockwise (minimum intensity) and place the lamp selector switch to the L1 position.

12. Repeat steps 2 through 8.

13. Set POWER switch to off position and disconnect unit from the 230VAC source.

14. Reset the 115VAC/230VAC switch to the 115VAC position.

5.4 TROUBLESHOOTING. Figure 5-1 provides troubleshooting flowcharts that permit technicians to locate faults and make repairs.

WARNING

When replacing or checking lamps ensure lamp is not hot. If lamp is hot use hand protection or allow lamp to cool for a minimum of 30 minutes.

5.5 CLEANING. After use, the light source can be cleaned with a sponge or towel lightly moistened with a mild soap solution. Follow with a sponge or towel moistened with clean tap water and air dry.

WARNING

Turn Light Source off and disconnect from power source prior to cleaning unit.

5.6 LAMP REPLACEMENT. When replacing a lamp refer to the following procedure:

a. To remove lamp, pull eject lever back toward operator. This will eject lamp from the socket.

b. Remove lamp.

c. Return eject lever back to original upright position.

d. To replace lamp, insert lamp into socket with pins in a horizontal position.

e. Push lamp firmly down until secured into socket.

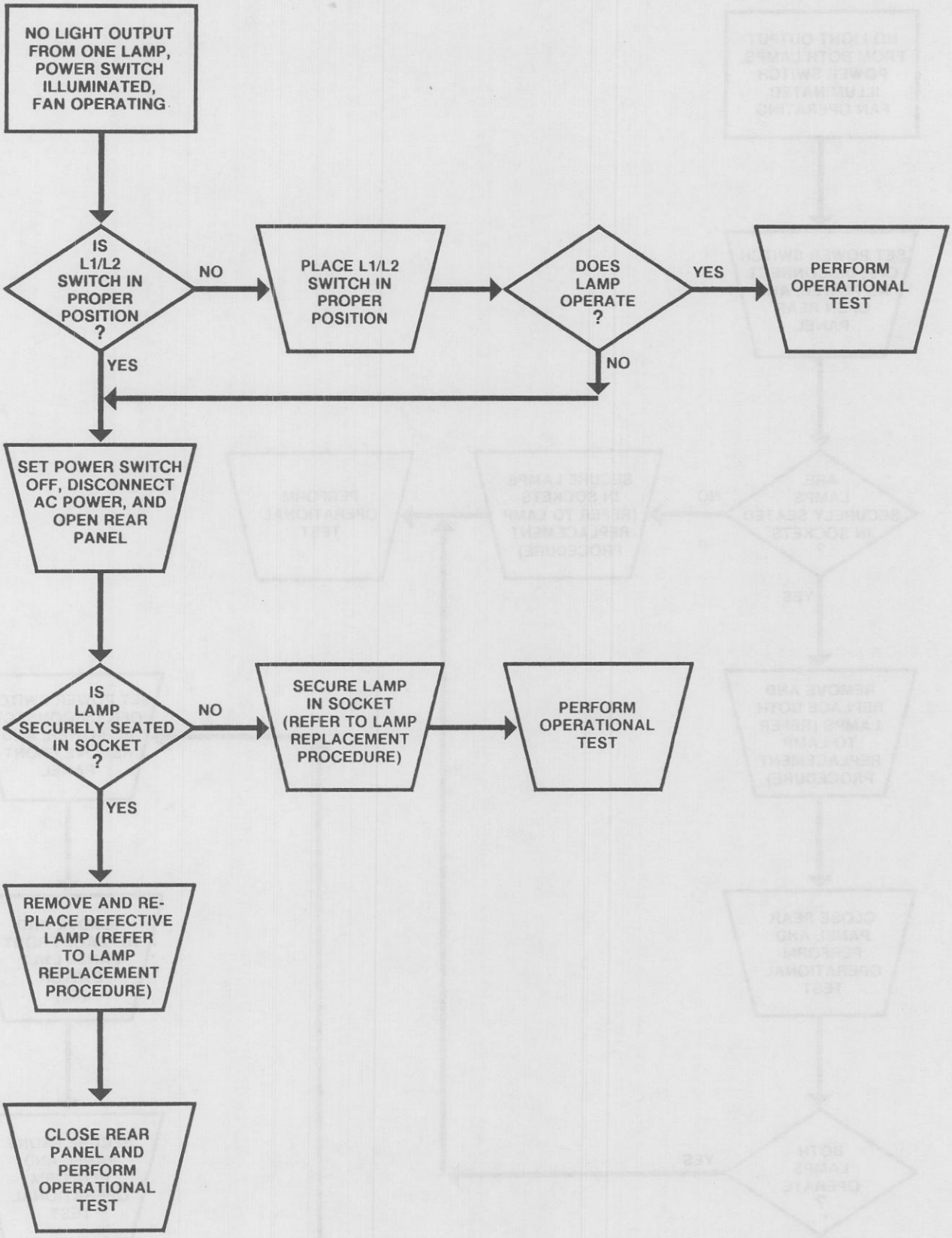

NO LIGHT OUTPUT FROM ONE LAMP, POWER SWITCH ILLUMINATED, FAN OPERATING
IS L1/L2 SWITCH IN PROPER POSITION ?
NO
PLACE L1/L2 SWITCH IN PROPER POSITION
DOES LAMP OPERATE ?
YES
PERFORM OPERATIONAL TEST
NO
YES
SET POWER SWITCH OFF, DISCONNECT AC POWER, AND OPEN REAR PANEL
IS LAMP SECURELY SEATED IN SOCKET ?
NO
SECURE LAMP IN SOCKET (REFER TO LAMP REPLACEMENT PROCEDURE)
PERFORM OPERATIONAL TEST
YES
REMOVE AND REPLACE DEFECTIVE LAMP (REFER TO LAMP REPLACEMENT PROCEDURE)
CLOSE REAR PANEL AND PERFORM OPERATIONAL TEST

Figure 5-1. Troubleshooting Flowchart (Sheet 1 of 6)

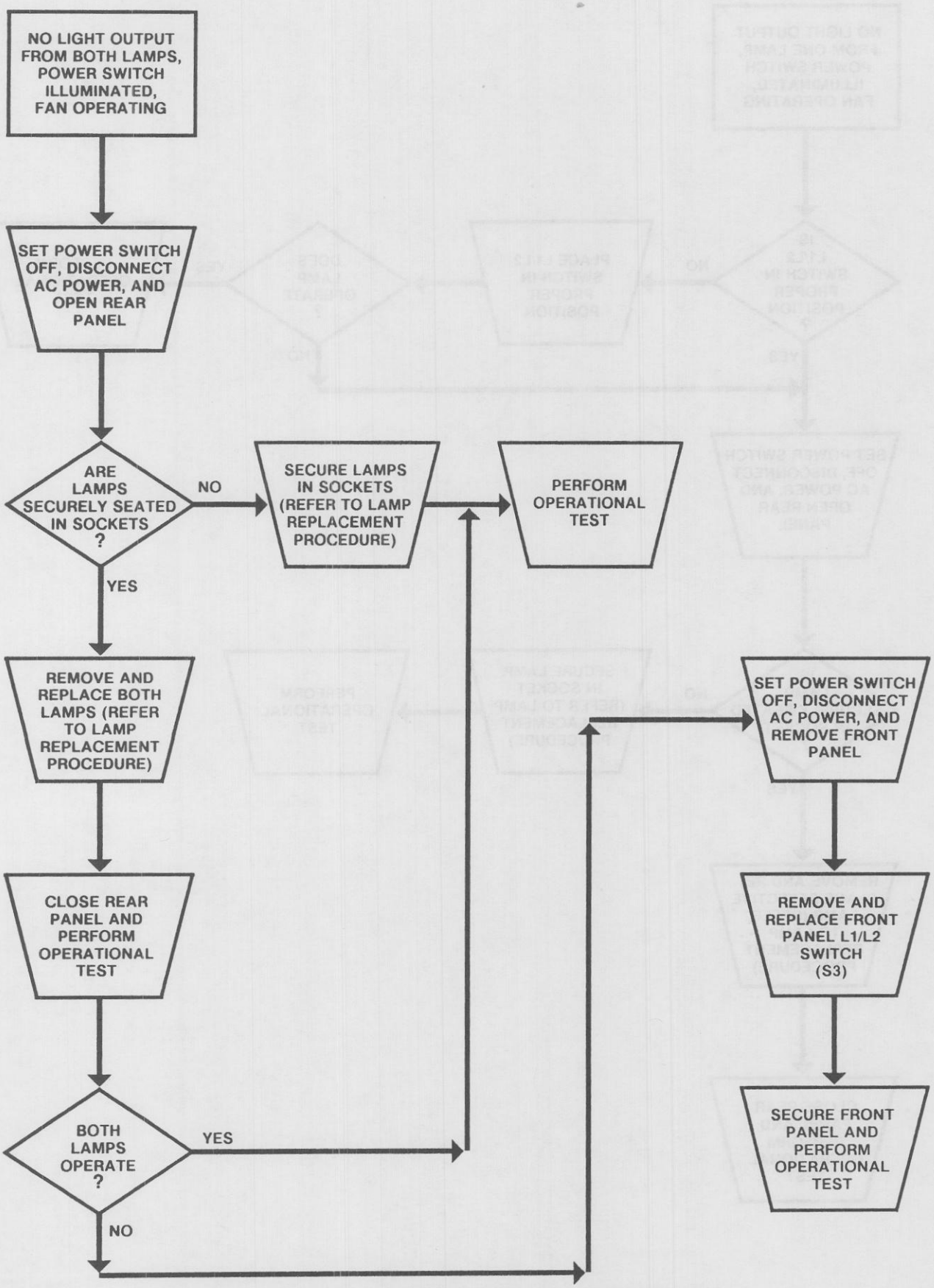

NO LIGHT OUTPUT FROM BOTH LAMPS, POWER SWITCH ILLUMINATED, FAN OPERATING
SET POWER SWITCH OFF, DISCONNECT AC POWER, AND OPEN REAR PANEL
ARE LAMPS SECURELY SEATED IN SOCKETS ?
NO
SECURE LAMPS IN SOCKETS (REFER TO LAMP REPLACEMENT PROCEDURE)
PERFORM OPERATIONAL TEST
YES
REMOVE AND REPLACE BOTH LAMPS (REFER TO LAMP REPLACEMENT PROCEDURE)
CLOSE REAR PANEL AND PERFORM OPERATIONAL TEST
BOTH LAMPS OPERATE ?
YES
NO
SET POWER SWITCH OFF, DISCONNECT AC POWER, AND REMOVE FRONT PANEL
REMOVE AND REPLACE FRONT PANEL L1/L2 SWITCH (S3)
SECURE FRONT PANEL AND PERFORM OPERATIONAL TEST

Figure 5-1. Troubleshooting Flowchart (Sheet 2)

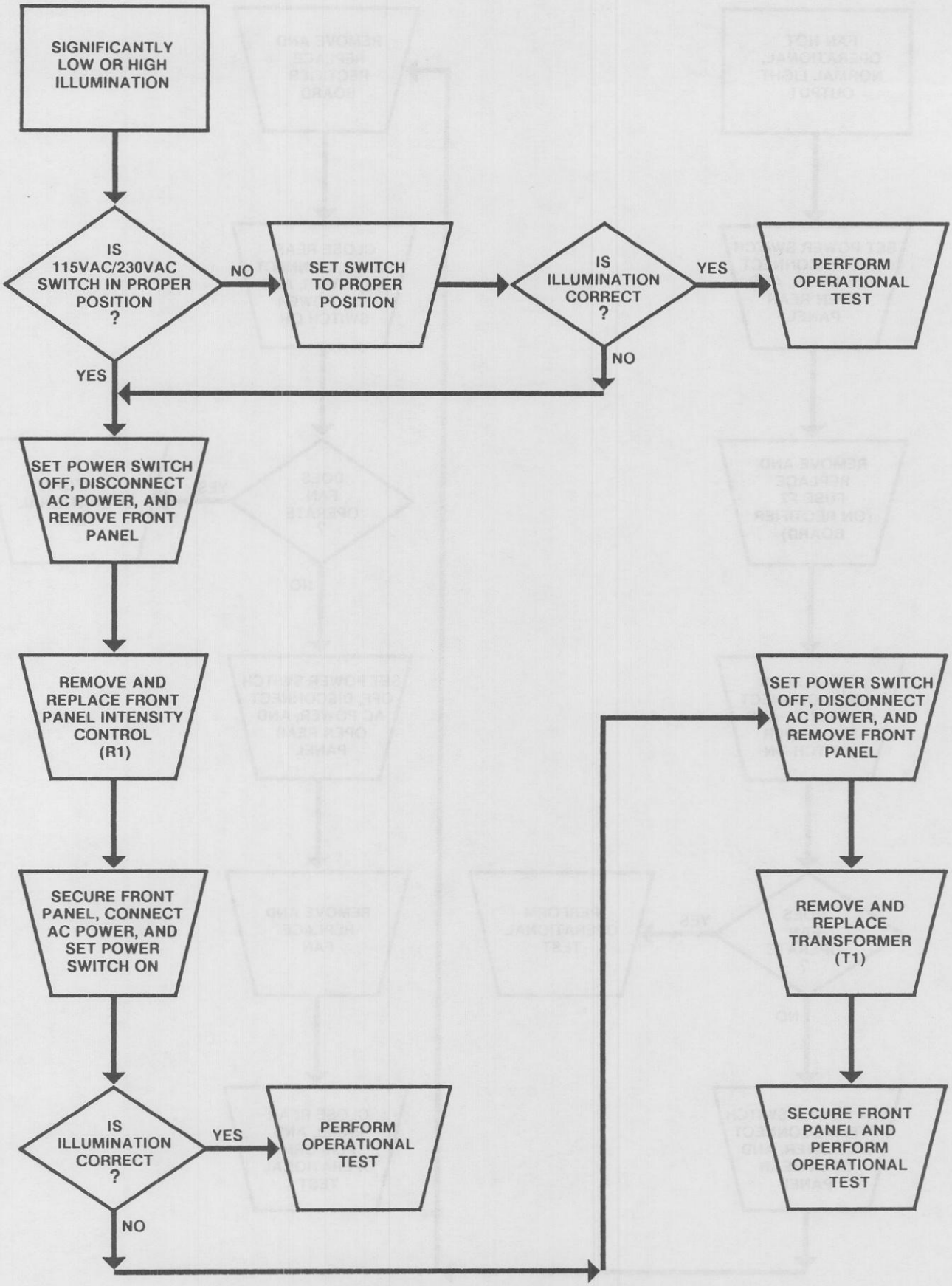

SIGNIFICANTLY LOW OR HIGH ILLUMINATION
IS 115VAC/230VAC SWITCH IN PROPER POSITION ?
NO
SET SWITCH TO PROPER POSITION
IS ILLUMINATION CORRECT ?
YES
PERFORM OPERATIONAL TEST
NO
YES
SET POWER SWITCH OFF, DISCONNECT AC POWER, AND REMOVE FRONT PANEL
REMOVE AND REPLACE FRONT PANEL INTENSITY CONTROL (R1)
SECURE FRONT PANEL, CONNECT AC POWER, AND SET POWER SWITCH ON
IS ILLUMINATION CORRECT ?
YES
PERFORM OPERATIONAL TEST
NO
SET POWER SWITCH OFF, DISCONNECT AC POWER, AND REMOVE FRONT PANEL
REMOVE AND REPLACE TRANSFORMER (T1)
SECURE FRONT PANEL AND PERFORM OPERATIONAL TEST

Figure 5-1. Troubleshooting Flowchart (Sheet 3)

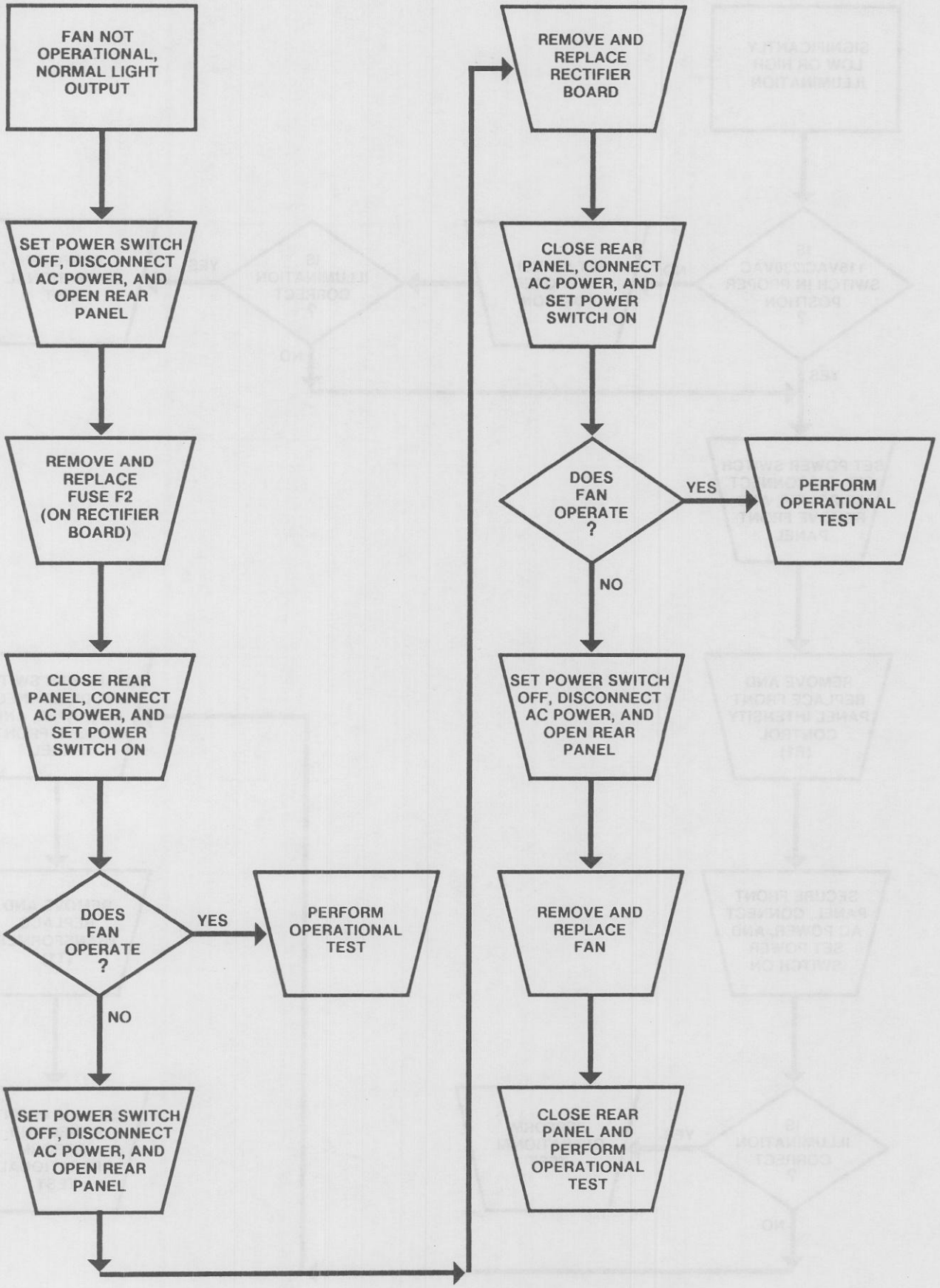

FAN NOT OPERATIONAL, NORMAL LIGHT OUTPUT
SET POWER SWITCH OFF, DISCONNECT AC POWER, AND OPEN REAR PANEL
REMOVE AND REPLACE FUSE F2 (ON RECTIFIER BOARD)
CLOSE REAR PANEL, CONNECT AC POWER, AND SET POWER SWITCH ON
DOES FAN OPERATE ?
YES
PERFORM OPERATIONAL TEST
NO
SET POWER SWITCH OFF, DISCONNECT AC POWER, AND OPEN REAR PANEL
REMOVE AND REPLACE RECTIFIER BOARD
CLOSE REAR PANEL, CONNECT AC POWER, AND SET POWER SWITCH ON
DOES FAN OPERATE ?
YES
PERFORM OPERATIONAL TEST
NO
SET POWER SWITCH OFF, DISCONNECT AC POWER, AND OPEN REAR PANEL
REMOVE AND REPLACE FAN
CLOSE REAR PANEL AND PERFORM OPERATIONAL TEST

Figure 5-1. Troubleshooting Flowchart (Sheet 4)

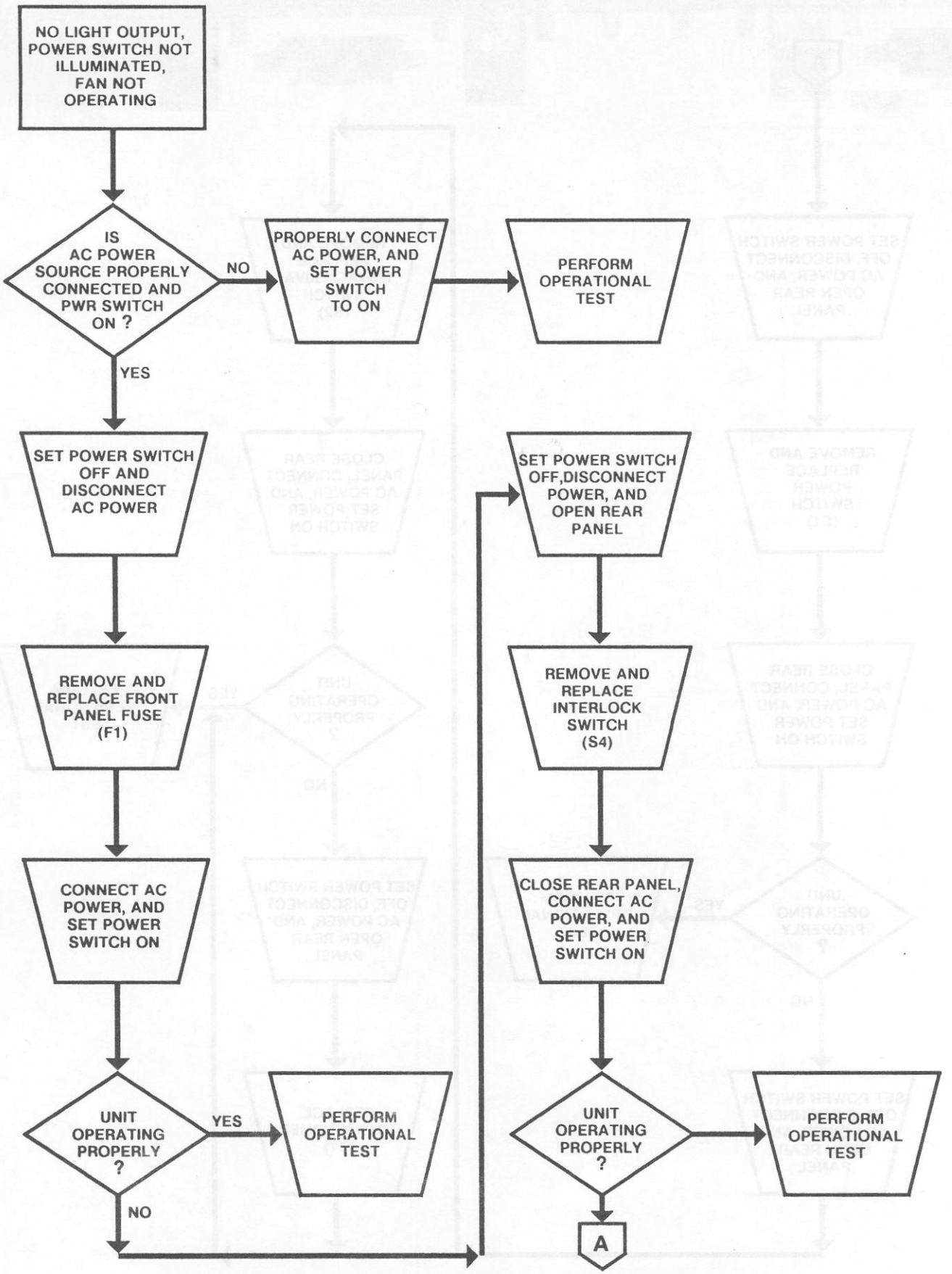

NO LIGHT OUTPUT, POWER SWITCH NOT ILLUMINATED, FAN NOT OPERATING
IS AC POWER SOURCE PROPERLY CONNECTED AND PWR SWITCH ON ?
NO
PROPERLY CONNECT AC POWER, AND SET POWER SWITCH TO ON
PERFORM OPERATIONAL TEST
YES
SET POWER SWITCH OFF AND DISCONNECT AC POWER
REMOVE AND REPLACE FRONT PANEL FUSE (F1)
CONNECT AC POWER, AND SET POWER SWITCH ON
UNIT OPERATING PROPERLY ?
YES
PERFORM OPERATIONAL TEST
NO
SET POWER SWITCH OFF,DISCONNECT POWER, AND OPEN REAR PANEL
REMOVE AND REPLACE INTERLOCK SWITCH (S4)
CLOSE REAR PANEL, CONNECT AC POWER, AND SET POWER SWITCH ON
UNIT OPERATING PROPERLY ?
PERFORM OPERATIONAL TEST
A
A

Figure 5-1. Troubleshooting Flowchart (Sheet 5)

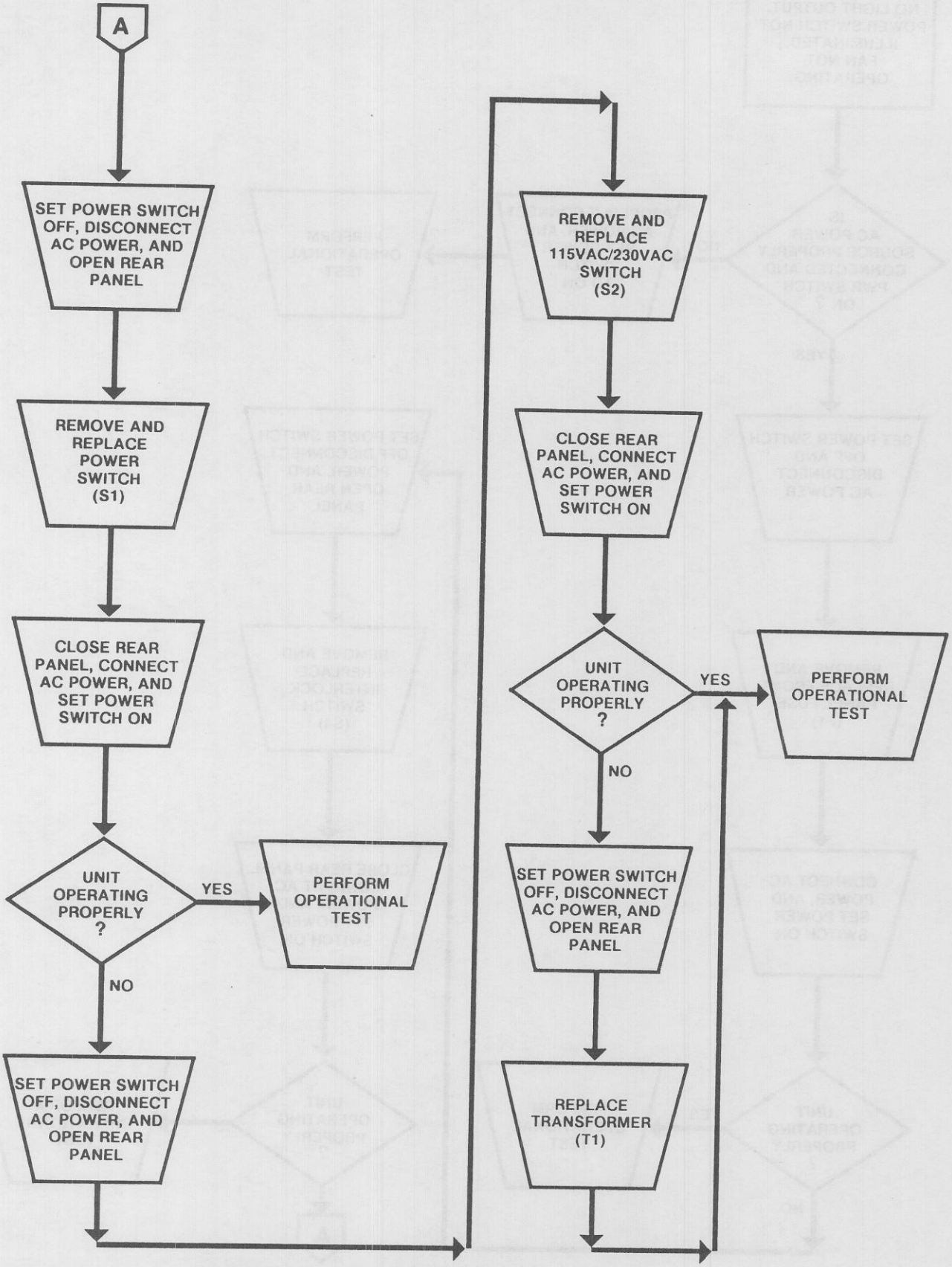

A
SET POWER SWITCH OFF, DISCONNECT AC POWER, AND OPEN REAR PANEL
REMOVE AND REPLACE POWER SWITCH (S1)
CLOSE REAR PANEL, CONNECT AC POWER, AND SET POWER SWITCH ON
UNIT OPERATING PROPERLY ?
YES
PERFORM OPERATIONAL TEST
NO
SET POWER SWITCH OFF, DISCONNECT AC POWER, AND OPEN REAR PANEL
REMOVE AND REPLACE 115VAC/230VAC SWITCH (S2)
CLOSE REAR PANEL, CONNECT AC POWER, AND SET POWER SWITCH ON
UNIT OPERATING PROPERLY ?
YES
PERFORM OPERATIONAL TEST
NO
SET POWER SWITCH OFF, DISCONNECT AC POWER, AND OPEN REAR PANEL
REPLACE TRANSFORMER (T1)

Figure 5-1. Troubleshooting Flowchart (Sheet 6)

SECTION 6
STORAGE

6.0 INTRODUCTION. This section contains storage instructions for the MLS-1 Light Source.

6.1 STORAGE INSTRUCTIONS. The light source may be stored for long periods of time, if the following conditions are met:

a. The unit should be placed in the original shipping carton or carrying case.

b. Storage area must be dry.

c. Unit must not be subjected to temperatures below -4 degrees F (-20 degrees C) and above 122 degrees F (50 degrees C).

SECTION 7
MAINTENANCE PARTS LIST

7.0 INTRODUCTION. This maintenance parts list (MPL) lists, describes, and illustrates the parts of the MLS-1 Light Source, part number MLS-1, manufactured for CIRCON ACMI, Stamford, CT. This MPL is intended for use in identifying and requisitioning parts.

7.1 MAINTENANCE PARTS LIST. The MPL consists of a breakdown of the complete light source into its major replaceable subassemblies and detail parts. Attaching parts are identified by (AP) immediately following the item they attach. The MPL is a five column format as follows:

a. ***Figure/Index.*** This column provides the figure and index numbers used to key a part or assembly listed in the MPL to its location in the associated illustration.

b. ***Part Number.*** This column provides the part number for only those parts recommended for maintenance of the light source. The listed part numbers consist of a contractor part number, a vendor part number, or a government standard part number. Parts recommended for local requisitioning are designated "COMCRL" in the part number column.

c. ***Federal Supply Code For Manufacturers (FSCM).*** This column provides the FSCM on the same line as the applicable part number. Codes, names, and addresses of vendors with assigned FSCM are listed in Cataloging Handbooks H4-1, H4-2 and H4-3.

d. ***Description.*** This column lists the item nomenclature plus those modifiers necessary to identify the item.

e. ***Quantity.*** This column lists the number of units required per assembly or subassembly.

Table 7-1. MLS-1 Light Source Maintenance Parts List

FIGURE/ INDEX NO.	PART NUMBER	FSCM	DESCRIPTION	QUANTITY
1 –	MLS-1	2S279	MLS-1 LIGHT SOURCE	1
– 1	MDX-2	7E222	FUSE, 2A	1
– 2	BUSS MKP-HH	71400	FUSE HOLDER	1
– 3	COMCRL		NUT (AP)	1
– 4	AH206R11E	04009	SWITCH, ON/OFF	1
– 5	13-2002	04426	SWITCH, LINE VOLTAGE SELECTOR	1
– 6	COMCRL		SCREW (AP)	2
– 7	COMCRL		WASHER (AP)	2
– 8	COMCRL		NUT (AP)	2
– 9	82605	04009	SWITCH, LAMP SELECTOR	1
– 10	COMCRL		NUT, KNURLED (AP)	1
– 11	COMCRL		WASHER, LOCK (AP)	1
– 12	COMCRL		WASHER (AP)	1
– 13	COMCRL		NUT (AP)	1

Table 7-1. MLS-1 Light Source Maintenance Parts List – (Cont)

FIGURE/ INDEX NO.	PART NUMBER	FSCM	DESCRIPTION	QUANTITY
1 –				
– 14	RB-67-2-B-SK-M	86797	KNOB, RHEOSTAT	1
– 15	COMCRL		SCREW, SET (AP)	2
– 16	4R0311	44655	RHEOSTAT	1
– 17	COMCRL		NUT (AP)	1
– 18	EJA	88204	LAMP, 150W, 21V	2
– 19	R1AL	88204	SOCKET, LAMP	2
– 20	COMCRL		SCREW (AP)	2
– 21	COMCRL		WASHER (AP)	2
– 22	81-1004-1	2S279	PANEL, FRONT	1
– 23	COMCRL		SCREW (AP)	4
– 24	81-1010	2S279	CIRCUIT BOARD, RECTIFIER	1
– 25	COMCRL		SCREW (AP)	2
– 26	81-1012	2S279	TRANSFORMER	1
– 27	COMCRL		NUT (AP)	4
– 28	COMCRL		WASHER (AP)	4
– 29	109D1224H102	8R136	FAN	1
– 30	COMCRL		SCREW (AP)	4
– 31	COMCRL		WASHER (AP)	8
– 32	COMCRL		NUT (AP)	4
– 33	E19-50H	01963	SWITCH, INTERLOCK	1
– 34	P + S5266HG	81091	PLUG, LINE, HG	1
– 35	SO 16/3X9	82879	CORD, LINE	1
– 36	1247	28520	BUSHING, LINE CORD	1
– 37	7071062	2S279	HANDLE	1
– 38	COMCRL		NUT (AP)	2
– 39	COMCRL		WASHER (AP)	2
– 40	HN5P-52-4-1	83014	LOCK, REAR PANEL PLUNGER	2
– 41	HN5G-52-1	83014	LOCK, REAR PANEL GROMMET	2
– 42	ALT/NDIA253W	1HN56	FOOT, RUBBER	4
– 43	COMCRL		SCREW (AP)	1
– 44	81-1002-1	2S279	CHASSIS, BOTTOM	1
– 45	81-1001-1	2S279	CHASSIS, COVER	1
– 46	81-1003	2S279	CHASSIS, REAR PANEL	1

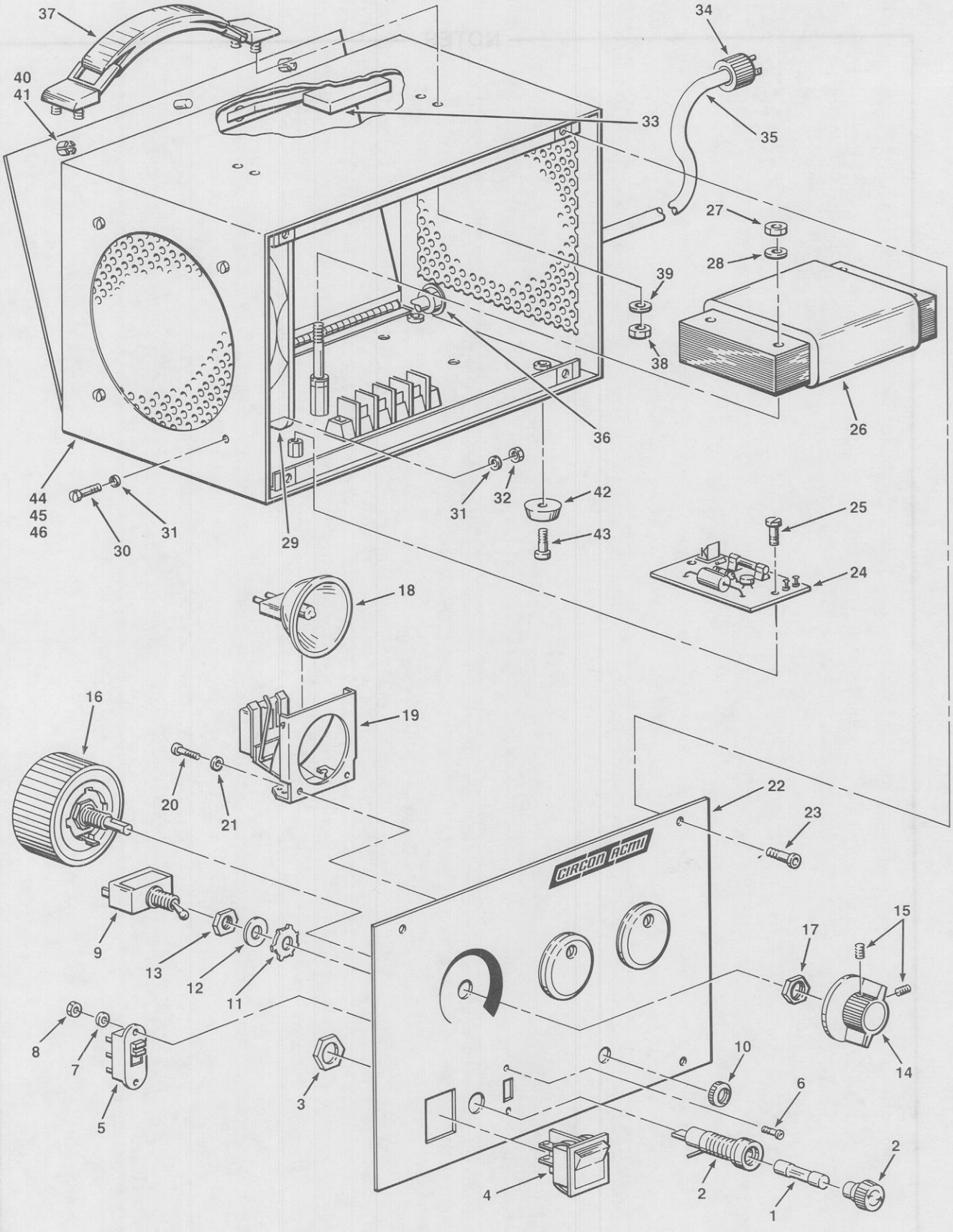


Figure 7-1. MLS-1 Light Source Parts Location Diagram

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